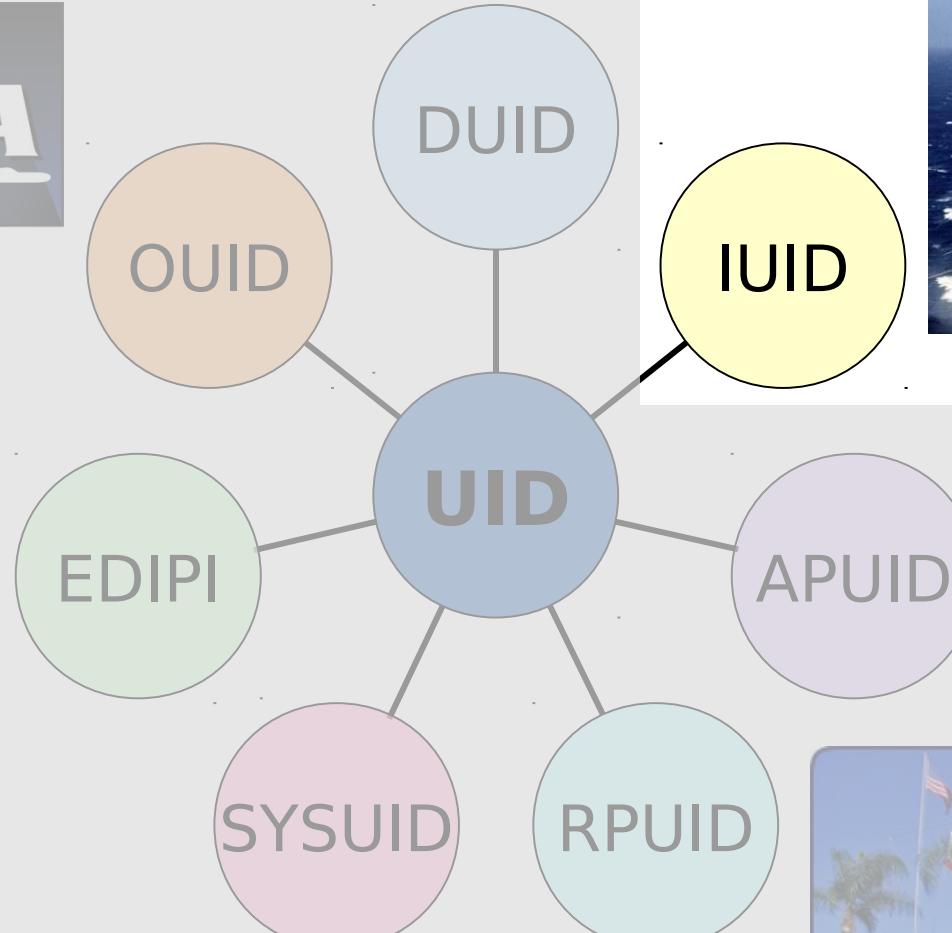


DASN (A&LM)'s IUID Education and Training Series

Item Unique Identification (IUID) 101

IUID Center
Representative
NSWC Corona, IUID
Center
12 May 2011¹

The World of Unique Identification (UID)



Item Unique Identification (IUID)

IUID is a system of marking items with globally unique Unique Item Identifiers (UIIs) that distinguish them from all other like and unlike items



UID/IUID is mandated within the DoD for all new item acquisitions, items the government already owns (legacy items), and government furnished property (GFP) meeting specific criteria



NATO
Policy Active
STANAG 2290
APUID-1



Netherlands
Policy active

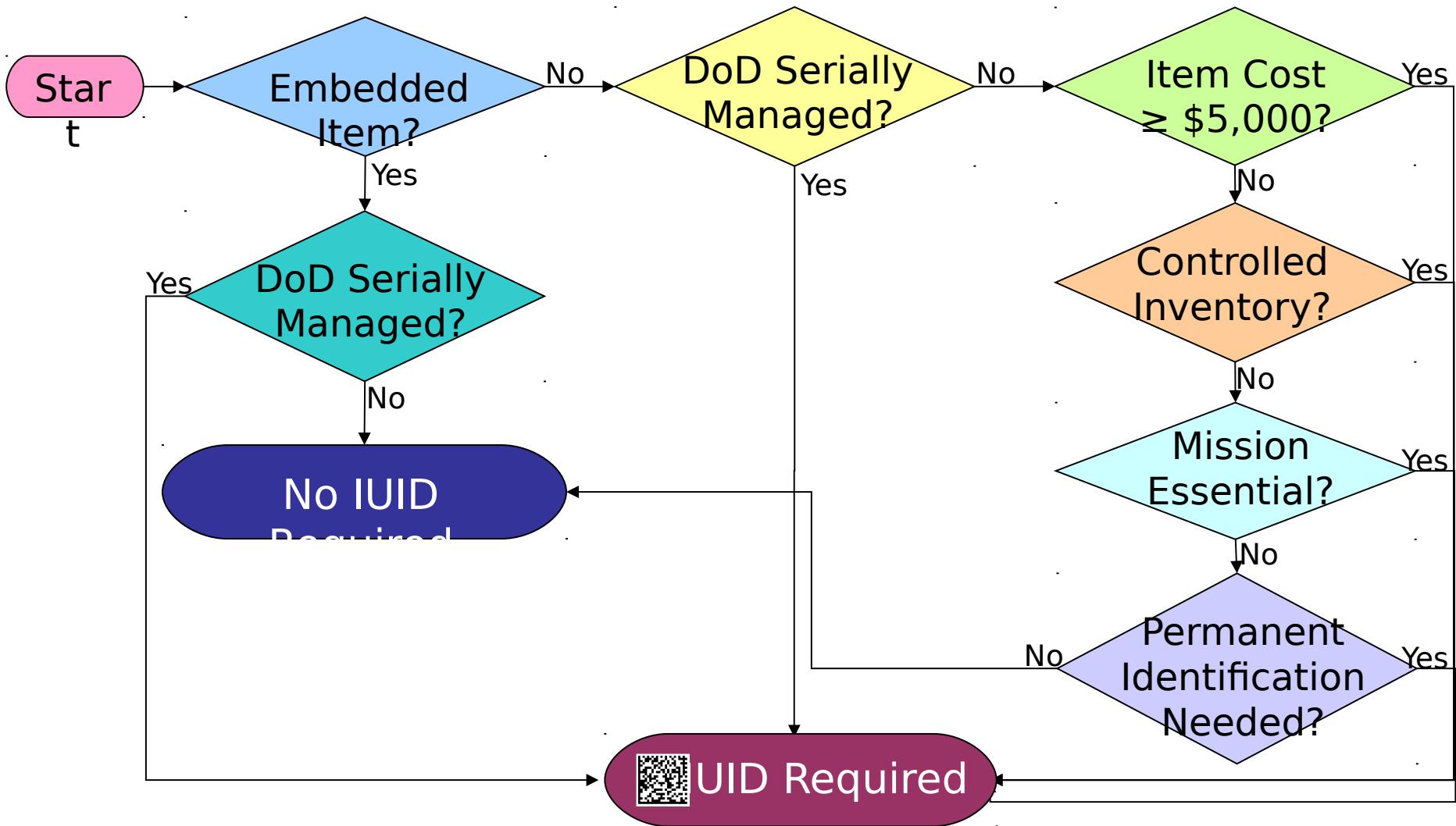


Canada
Clause
Implemented

Where is the Requirement?

- OUSD (AT&L) Policy Memoranda
 - IUID Requirement for New Acquisitions, 29 Jul 03
 - IUID Requirement for Legacy and GFP, 23 Dec 04
 - IUID Policy Refinement for Secondary Items in Use or in Inventory, 30 Dec 10
- DoD Directive
 - 8320.03 UID Standards for a Net-Centric DoD
- DoD Instructions
 - 4151.19 Serialized Item Management for Materiel Maintenance
 - 5000.02 Operation of the Defense Acquisition System
 - 5000.64 Accountability and Management of DoD-Owned Equipment and
 - Other Accountable Property
 - 8320.04 IUID Standards for Tangible Personal Property
- DFARS Prescription and Clauses
 - 252.211-7003 Item Identification and Valuation
 - 252.211-7007 Reporting of Government-Furnished Equipment in the DoD Item Unique Identification (IUID) Registry
 - 211.274 Item Identification and Valuation Requirements
- SECNAV Instruction
 - 4440.24 Implementation of Item Unique Identification within the

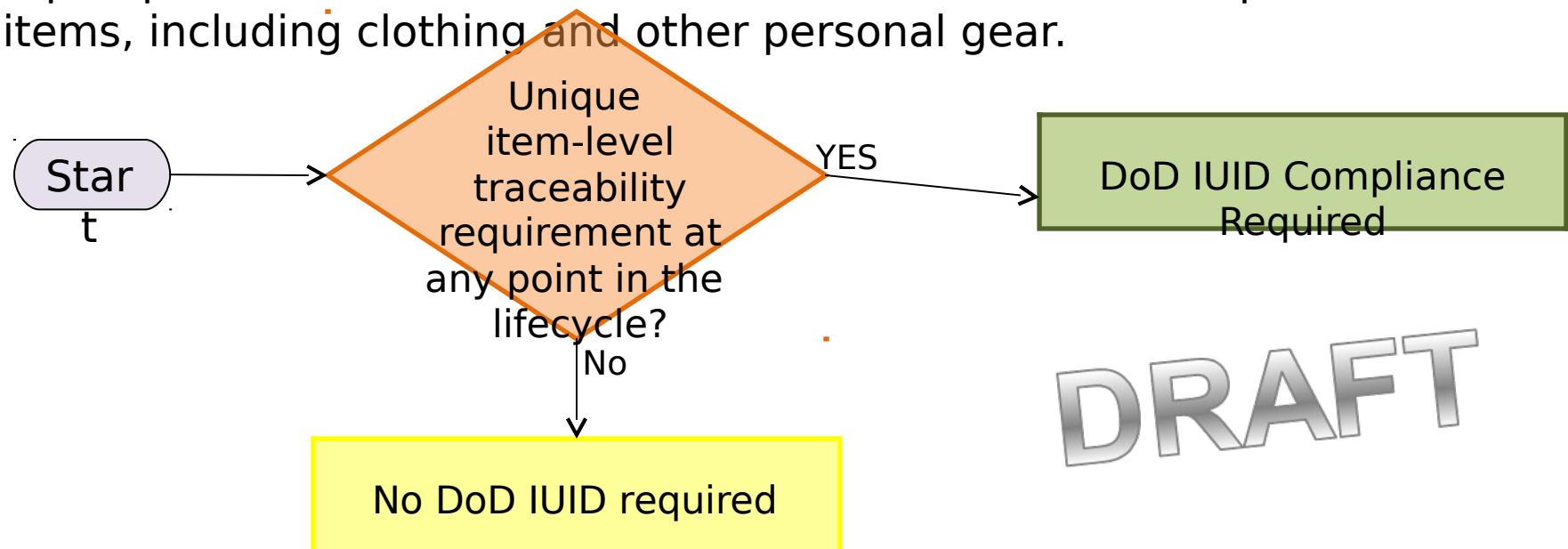
What is the Policy for DoD?



What is the Policy for Secondary Items in Inventory or Use?

Unique item-level traceability: the requirement to trace lifecycle management events related to acquisition, property accountability, storage, operation, maintenance, safety, physical security, retirement, and disposal by each individual item.

Secondary item: an item that is not defined as a principle item and includes repairable components, subsystems, and assemblies, consumable repair parts, bulk items and material, subsistence, and expendable end items, including clothing and other personal gear.



DRAFT

Automatic Identification Technology (AIT)

1-D



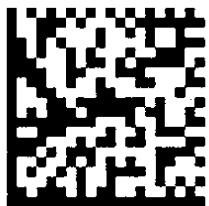
es

(AIT)

Contact
Memory
Buttons



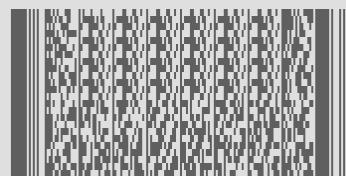
2-D Barcodes



Data Matrix



QR Code

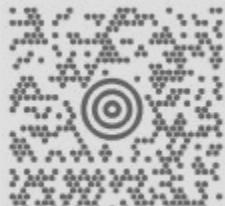


PDF4

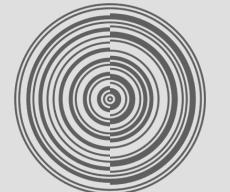
17



Azte
c

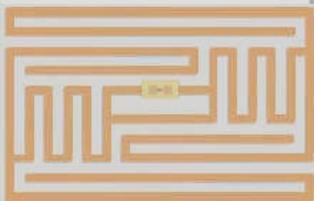
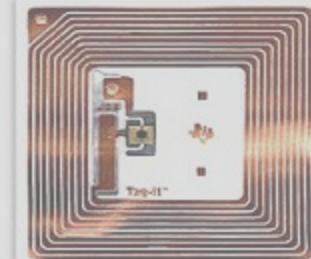
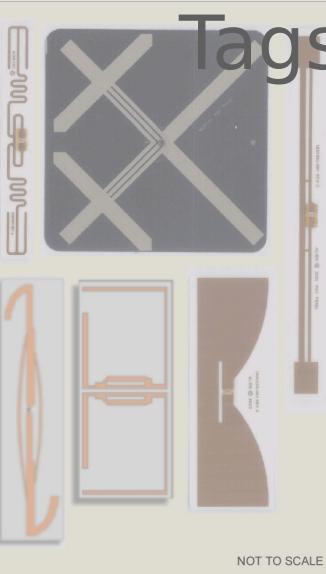


MaxiCo
de



Bullseye

Passive RFID



EPC RFID

Tag

Active RFID Tags



Scope of the UII

A UII is...

- a data element
- a unique identifier for an item
- globally unique
- permanent
- created by concatenating specific data elements
- an enabler for business intelligence

A UII is not...

- a device for communicating data, such as Radio Frequency Identification (RFID) tags or contact memory buttons
- a replacement for the National Stock Number (NSN)
- intelligent data that yields

Why IUID?

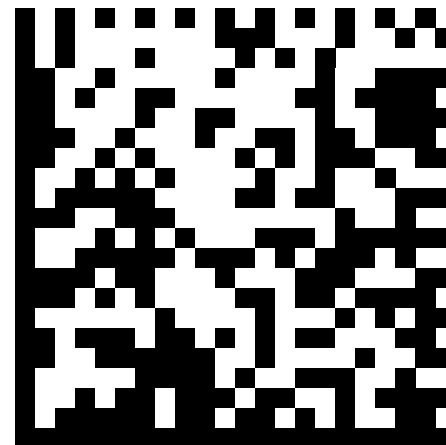
IUID provides...

- the “**data key**” to item lifecycle **traceability** in business processes and information systems
- **reliable** and **accurate data** for financial, accountability, and asset management purposes

IUID enables...

- the discovery and **correlation** of item information
- **globally accessible** and secure enterprise data
- joint **paperless** management

Can You Spot the IUID?



Each one is a data matrix, but only one is an

An IUID is always a data matrix
A data matrix is not always an IUID

A Tale of Two Constructs



What's an EID?
Identifies the organization
ensuring the uniqueness
of the UII

Construct #1: Serialized within the enterprise identifier (EID)

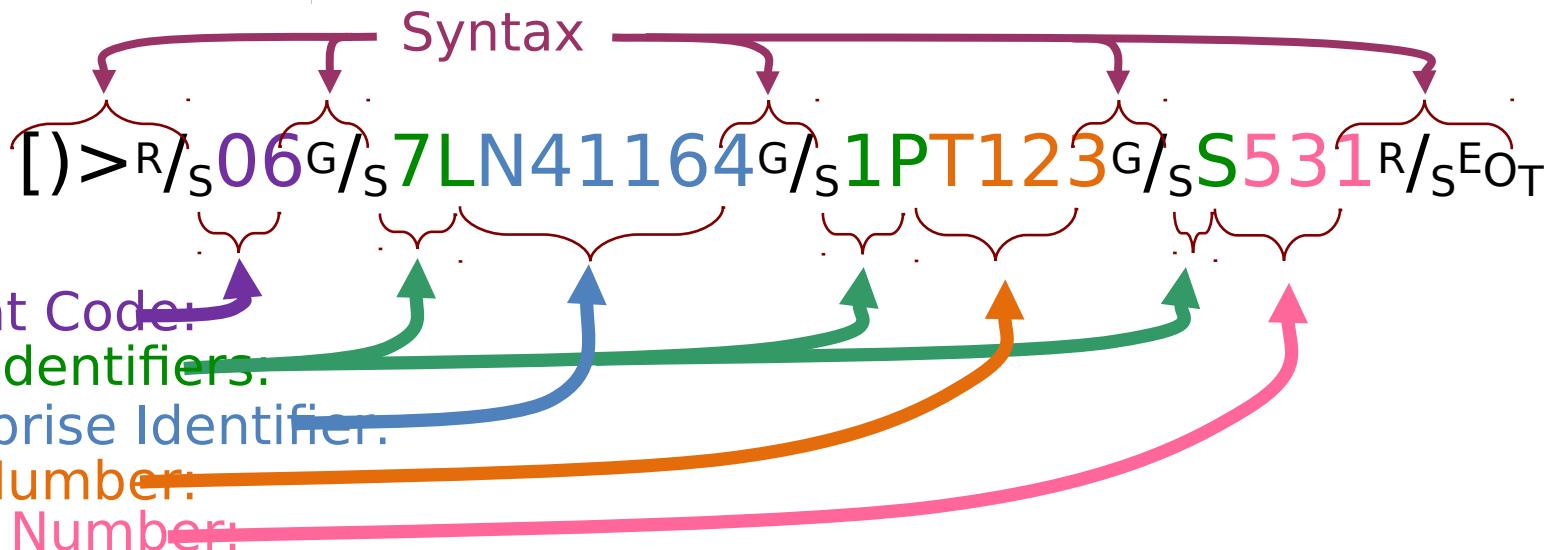
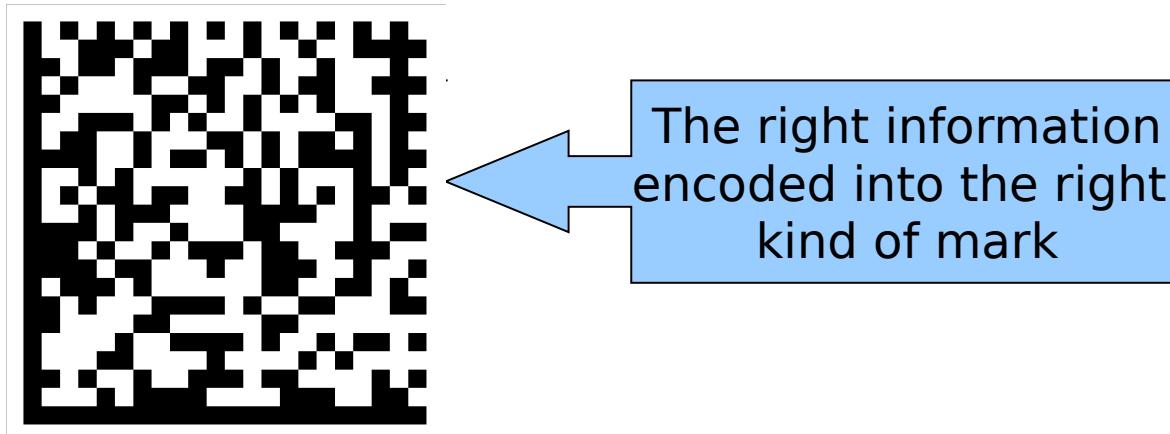
Contains the EID and the serial number (no part number)

Construct #2: Serialized within the part number

Contains the EID, part number, and serial number
There are three permitted format codes for either construct

The format code determines the semantics of the encoded string

Turning a Data Matrix into an IUID



IUID Data Constraints

- Must be encoded into an ECC200 Data Matrix barcode
- Must include syntax from ISO/IEC 15434
- Must include appropriate semantics
- Must adhere to data element length requirements
- Must use only A through Z, 0 through 9, /, and -
No lower case letters, periods, asterisks, commas, ...
- **Ull \leq 50 characters**
- Ull must be unique across the globe
- Ull must be “permanent”... forever

Vocabulary Recap – Part I

Unique Identification (UID) is a system of identifying entities to distinguish them from each other.

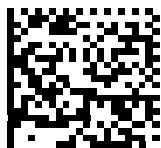
Item Unique Identification (IUID) is a system of marking items with globally unique, Unique Item Identifiers (UIIs) that distinguish them from all other like and unlike items.

Unique Item Identifier (UII) is a string of characters which is globally unique. Exactly one UII is assigned to exactly one item.

Vocabulary Recap – Part II



Data Matrix is a two-dimensional matrix barcode made up of square modules arranged within a perimeter finder pattern



IUID Compliant Data Matrix is an ECC200 Data Matrix encoded in accordance with the semantics of ISO 15418, syntax of ISO 15434, and all required data

IUID Compliant Data Matrix Encoded String

`[]>^/_$06^/_$7LN41164^/_$1PT123^/_$S531^/_$EO_T`

Tips for IUID Specifications in Contracts

Can specify...

...mark shall be read in full sunlight

...mark shall be read by a {fill in name of barcode scanner here}

...mark shall be placed {fill in somewhere convenient to read here}

...mark shall be readable after rubbing the mark with a hydraulic-
fluid-dipped thumb

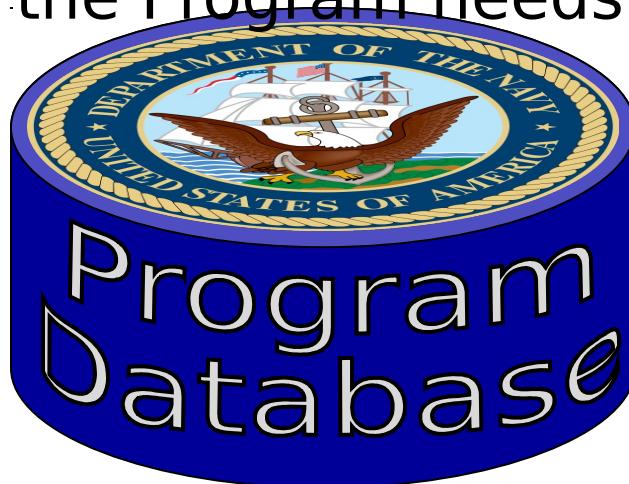
...mark shall be readable after {fill in some overhaul
procedure here}

Cannot specify...

...what data to put into the mark

The IUID Registry

Contains all
the
data/information
the Program needs



UNCLASSIFIED

- ~~Location~~

- Condition

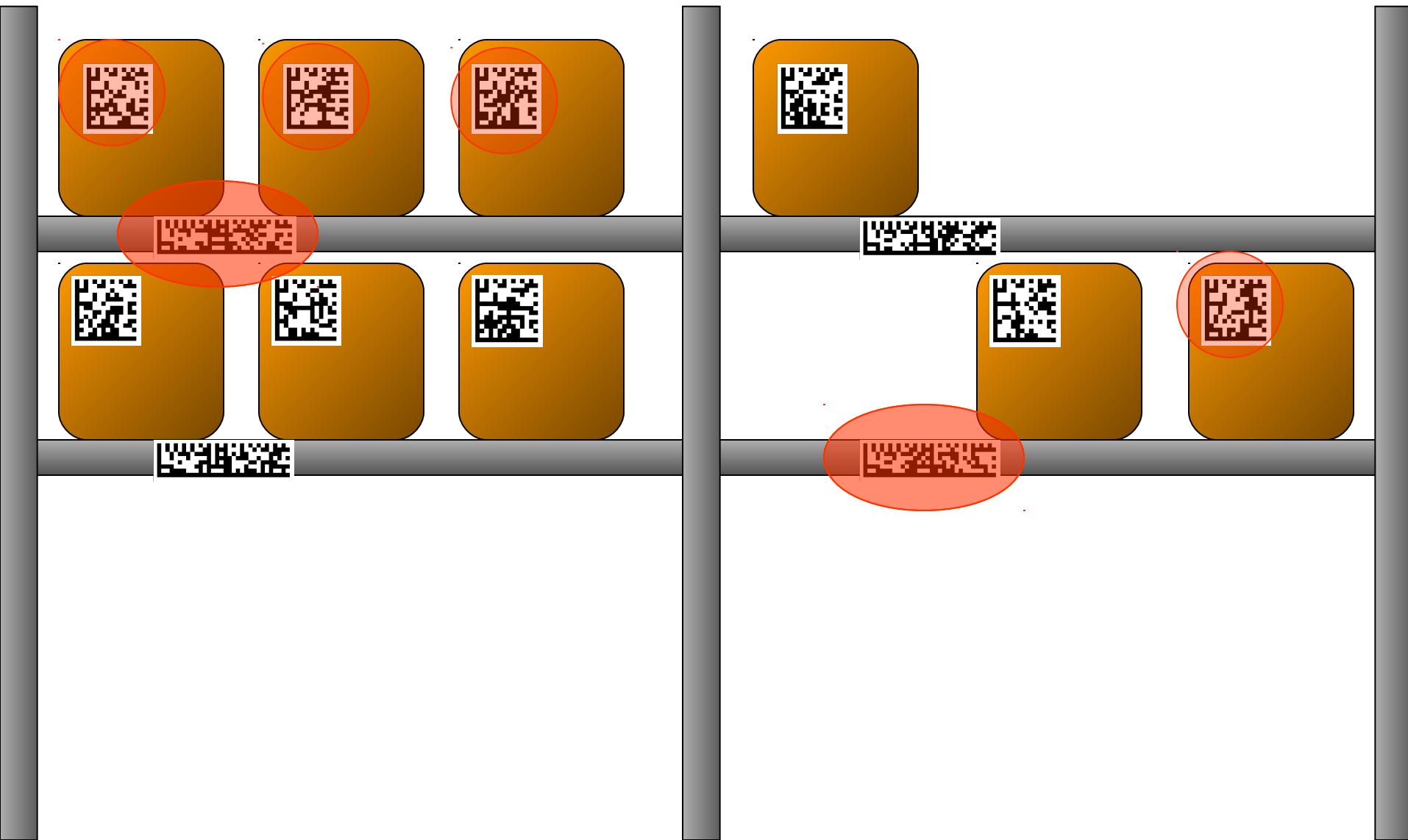


- Limited to the Program
- Feeds the IUID Registry

- Spans all DoD
- Ensures uniqueness

UNCLASSIFIED

Business Rules Supported by Barcode Scanning



You Don't Know What You've Got 'Til It's Gone

Keeping Track of 4860 Items in a Warehouse



Without Scanning...

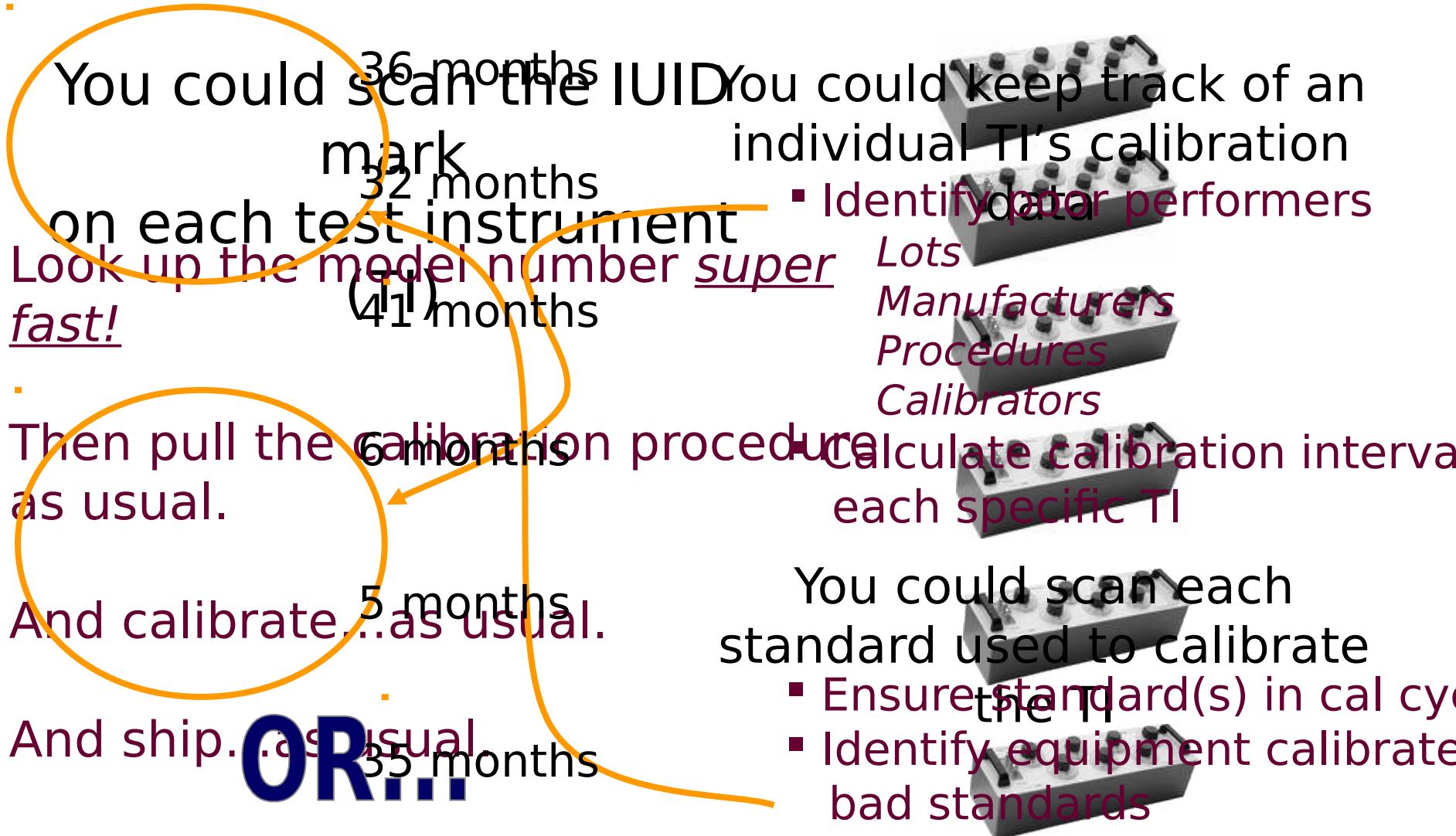
- Full inventory never completed
- Sample data estimates 32.4 hours to complete inventory with 2% error rate

With IUID Scanning...

- Full inventory completed in 6 hours
- Experience with scanning decreases inventory time to 55 minutes with 100% accuracy



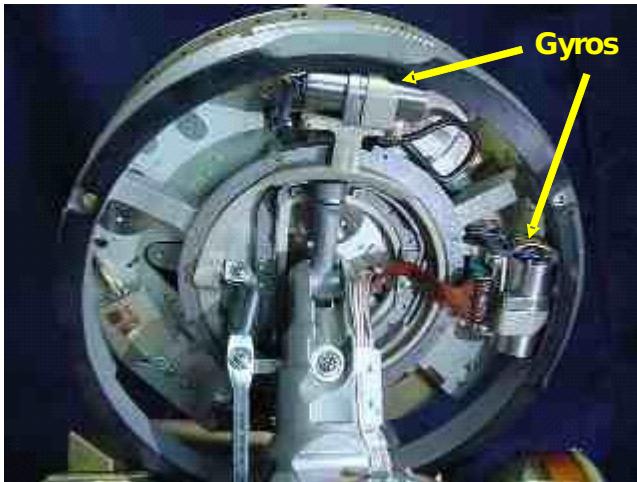
IUID in Maintenance



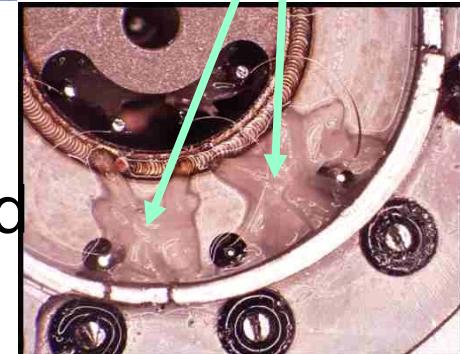
Many of the Benefits are Universal

Good Data, Good Analysis

Test data analysis found a problem with gyroscopes used in STANDARD Missiles



Crystallized Deposits



Configuration data identified affected missiles and targeted specific units for testing

lateral Damage = None

Casualties =

0

Misfires = 0

Location data found a convenient unit to test

Lessons Learned

- IUID is about more than marking and registering concatenated UIIs and their data elements
- IUID should be considered in the global context
 - Not just a DoD initiative
 - International benefits across government agencies, industry, coalition partners
- Identify and involve all stakeholder groups in planning efforts
 - Groups involved in implementing IUID
 - Groups that can and will benefit from IUID
- Consider existing marking item management practices first
 - How are items marked today?
 - Is there available room to add IUID marking on existing data plates and labels?
- Ensure serialized item management practices are integrated with IUID
 - IUID must be the data key for SIM to enable true lifecycle data association

Lessons Learned

- DoD is responsible for determining which items require IUID in solicitations
 - Contractors may go beyond IUID requirements
- Government must communicate requirements clearly
 - Contract structure (e.g. use of line items, attachments, exhibits)
 - Provision of technical authority and documentation when required
 - For items used in multiple programs, if one requires IUID, all should require IUID
- Ensure IUID is integrated into Quality Assurance processes
 - Quality must be introduced at the front end
 - Readability and accuracy are crucial throughout the lifecycle
- IUID can serve as a forcing function to standardize
 - Mergers and acquisitions have created complexity in property management
 - Manufacturers can benefit from lifecycle data as well as government

IUID Resources

OSD UID Policy Office Website www.uniqueid.org
Trusted site for policy, updates, FAQs, and IUID newsletter

DoN IUID Website

https://acquisition.navy.mil/rda/home/acquisition_one_source/item_unique_identification_iuid

MIL-STD 130 (current version is N as of 15 May 2011)
Marking standards and requirements

DoD Guide to Uniquely Identifying Items, v2.0
Business rules, additional guidance for legacy items

IUID Toolkit www.iuidtoolkit.com
Role based roadmaps for IUID implementation

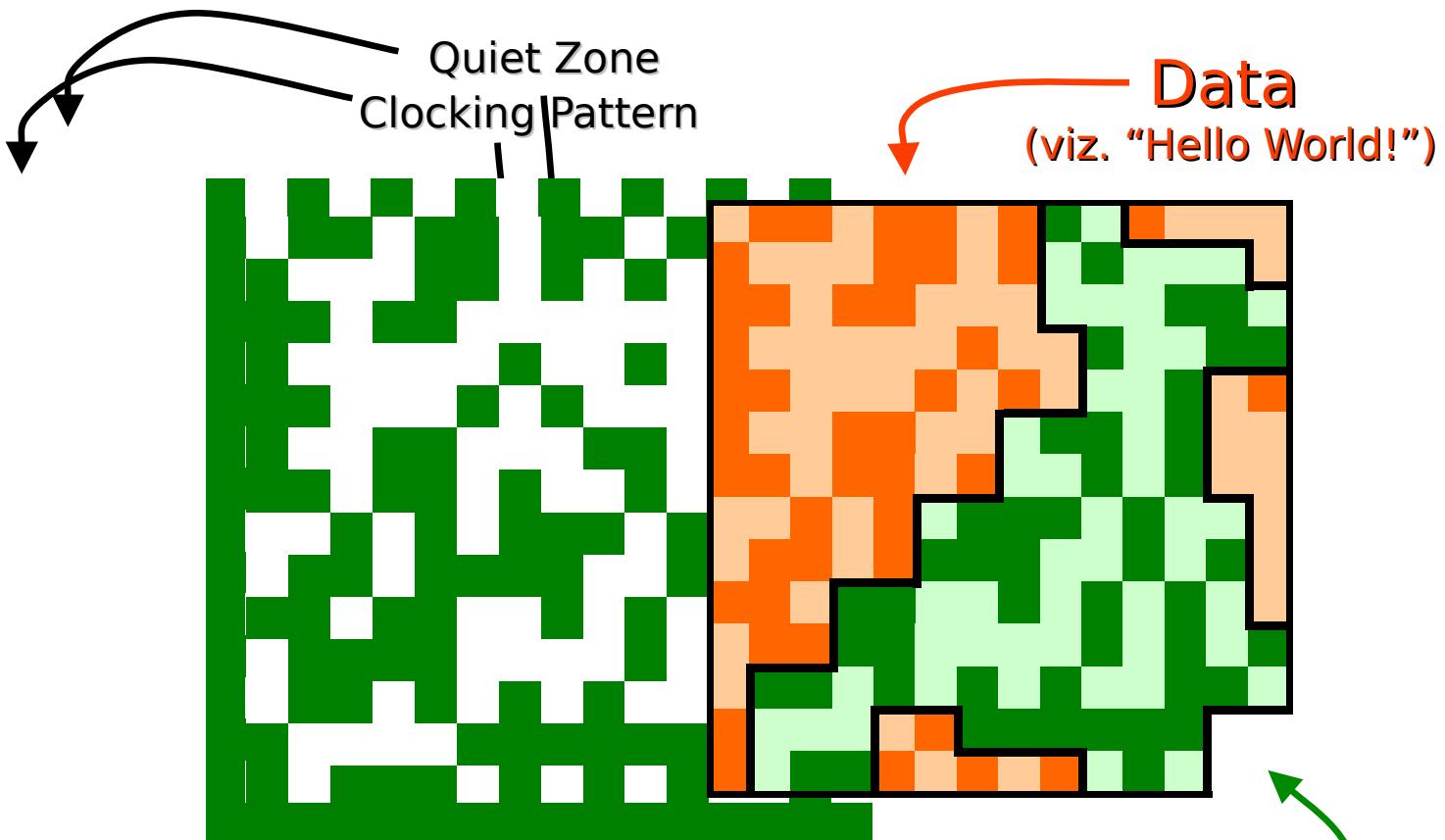
Defense Acquisition University (DAU) www.dau.mil
Continuous Learning Courses (CLM200, CLE 040) to increase IUID knowledge



QUESTIONS & ANSWERS

Hello

World!



Finder Pattern

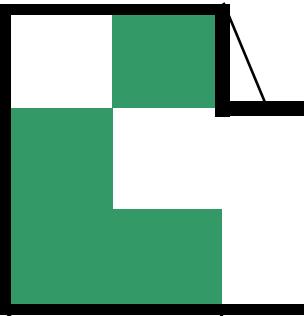
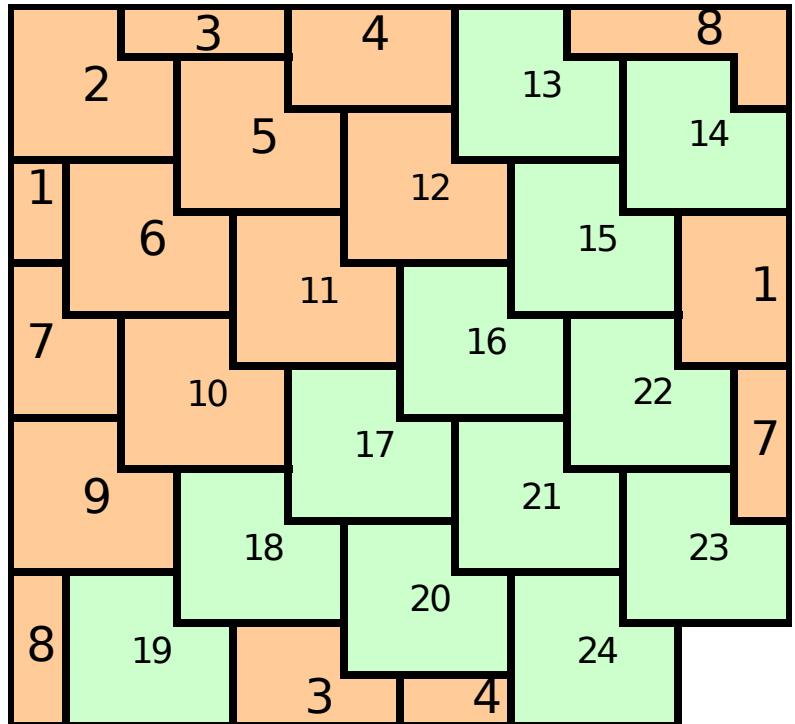
Quiet Zone
Clocking Pattern

Data
(viz. "Hello World!")

"Hello World!" is encoded into this
ECC200 Data Matrix 2-D Barcode

Error Correction

ECC 200 Data Matrix Map

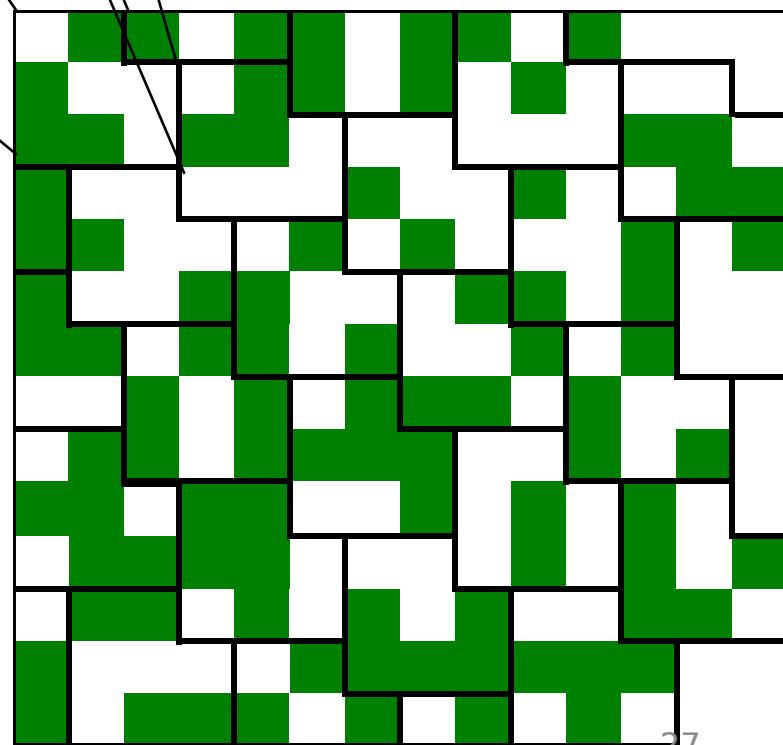


$01100110 = 102$

ASCII → “e”

Hello World!

1	2
3	4
6	7



A 16 x 16 Data Matrix holds
12 bytes with the data
&
12 error-correcting bytes

Reading vs. Verifying Marks

The vocabulary of IUID distinguishes “reading,” “verifying,” and “validating”

Reading the mark decodes the text in the mark.

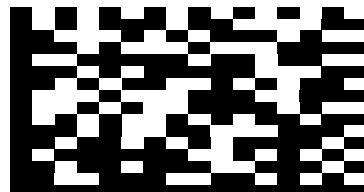
Verifying the mark ensures the quality of the mark meets the standards for contrast, squareness, straight edges, etc.

Validating the mark makes sure all of the correct ASCII characters that ought to be in the mark are in the mark. It makes sure that all the illegal characters that shouldn’t be in the mark aren’t. It makes sure that all other IUID business rules are followed with respect to the mark’s content.

Verification

Verification grades (“A”–“F”) eight characteristics of the mark

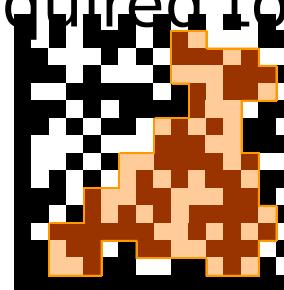
Grades of “B” or higher are required to pass the mark



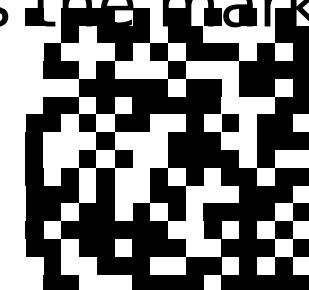
Axial
Non-
uniformity



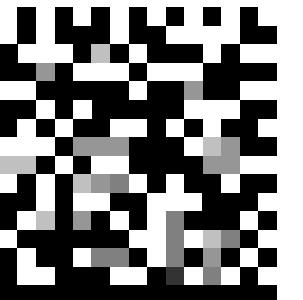
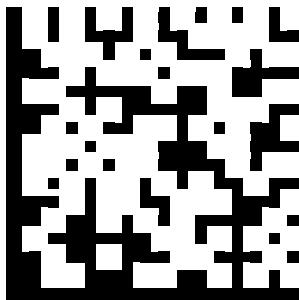
Grid
Non-
uniformity



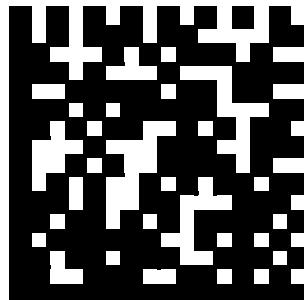
Unused
Error
Correction



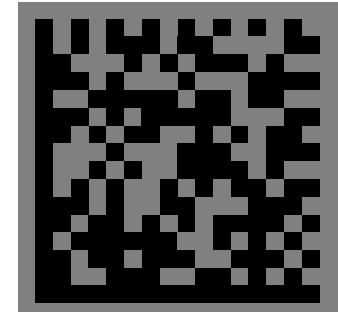
Fixed Pattern
Damage



Modulation



Over-print



Under-print

Contrast

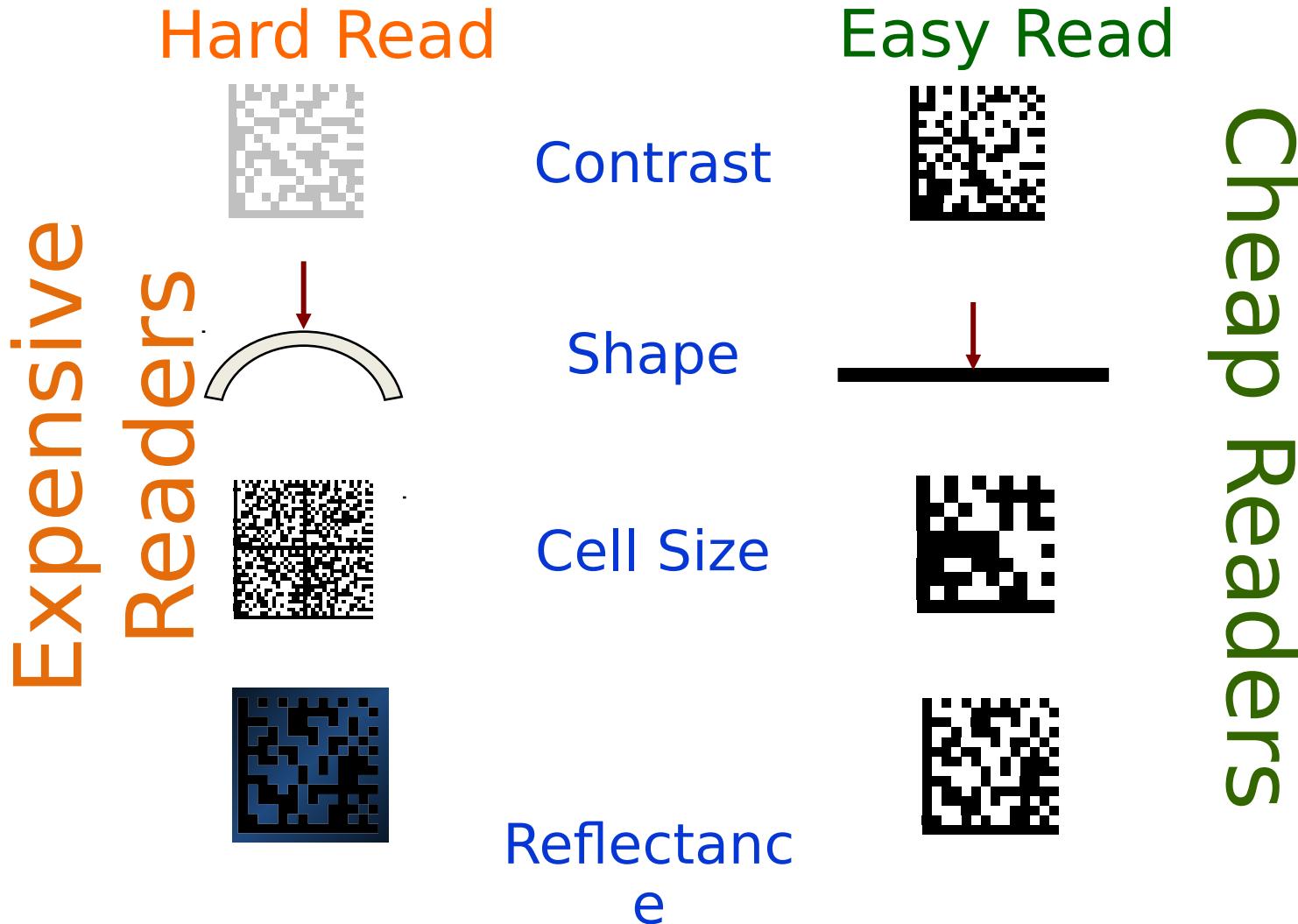
A Readable, Failing Mark



UNDER PRINT
OVER PRINT
CLOCKING PATTERN
DAMAGE

FINDER PATTERN
DAMAGE

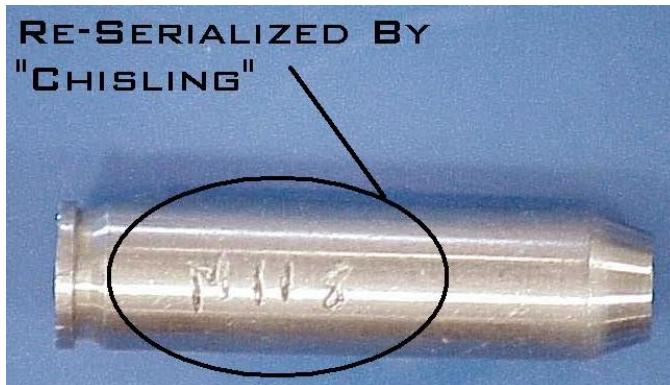
Readability of the Mark



When a Marine Needs to Turn in M118... They Turn in M118

Marines reserialize gages to pass inspection

**Accountability is lost
Errors enter the information system**



**With IUID Reserialization is No Longer
a Problem**